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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SINGH, PREM C

ART UNIT PAPER NUMBER

1764

DATE MAILED: 08/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/671,080

Applicant(s)

CHEN ET AL.

Examiner

Prem C. Singh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 19-51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 19-51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Amendment to claim 19 and cancellation of claims 1-18 and 52 is noted.

Objection to claim 19 is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

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were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 19-31, 33-35, 37-41, 45-46, and 49-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ladwig et al (US Patent 6,093,867).

Ladwig invention discloses a process for selectively producing C₃ olefins from a catalitically cracked or thermally cracked naphtha stream (Column 1, lines 6-8). Naphtha boiling range streams are typically those having a boiling range from about 65°F to about 430°F, preferably from about 65°F to 300°F (Column 3, lines 1-3). They can be derived from the fluid catalytic cracking (FCC) of gas oils and resids, or they can be derived from delayed or fluid coking of resids (Column 3, lines 5-8).

Ladwig invention further discloses a process which receives naphtha from a suitable source in the refinery. The reaction zone is operated at process conditions that will maximize C₂ to C₄ olefin, particularly propylene, selectivity with relatively high conversion of C₅+ olefins. Catalysts suitable for use in the process of the present invention are those which are comprised of a crystalline zeolite having an average pore diameter less than about 0.7 nanometers (nm), said crystalline zeolite comprising from about 10 wt % to about 50 wt % of the total fluidized catalyst composition (Column 3,

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lines 52-62). The pore diameter also some times referred to as effective pore diameter can be measured using standard adsorption techniques (Column 4, lines 1-3). The medium pore size zeolites generally have a pore size from about 5 Å to about 7 Å and include for example, MFI, MFS, MEI, MTW, EUO, MTT, HEU, FER, and TON structure type zeolites. Non-limiting examples of such medium pore size zeolites include ZSM-5, ZSM-12, ZSM-22, ZSM-23, ZSM-34, ZSM-35, ZSM-38, ZSM-48, ZSM-50, silicalite, and silicalite 2 (Column 4, lines 11-18). Other suitable medium pore size zeolites include the silicoaluminophosphates (SAPO) such as SAPO-4 and SAPO-11, ALPO-11, TASO-45, TAPO-11. In one embodiment of the present invention the Si/Al ratio of said zeolites is greater than about 40 (Column 4, lines 11-35).

Ladwig invention also discloses that the process conditions include temperatures from about 500°C to about 650°C, preferably from about 500 to 600°C, hydrocarbon partial pressures from about 10 to 40 psia, preferably from about 20 to 35 psia, and a catalyst to naphtha (wt/wt) ratio from about 3 to 12, preferably from about 4 to 10 (Column 4, lines 64-67; column 5, lines 1-2). Also, it is preferred that the naphtha residence time in the reaction zone be less than about 10 seconds, for example from about 1 to 10 seconds. The above conditions will be such that at least about 60 wt % of the C₅+ olefins in the naphtha stream are converted to C₄- products and less than about 25 wt %, preferably less than 20 wt % of the paraffins are converted to C₄- products, and that propylene comprises at least about 90 mol %, preferably greater than about 95 mol % of the total C₃ reaction products with the weight ratio of propylene/total C₂- products greater than about 3.5. It is also preferred that ethylene comprises at least

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about 90 mol % of the C₂ products with the weight ratio of propylene: ethylene being greater than about 4 (Column 5, lines 5-16, lines 48-49). Ladwig invention shows in Examples 18-21 about using a cat cracker naphtha as feed consisting of 15% paraffins and 85% olefins (Column 7, lines 13-16).

Ladwig invention does not specifically mention first and second molecular sieves and the difference in pore size index of the two molecular sieves.

Ladwig invention does not explicitly disclose that the molecular sieves have one dimensional non-interconnecting and three dimensional interconnecting channels.

The applicant uses ZSM-5 as the first molecular sieve and SAPO-11 as the second. Since Ladwig invention discloses that ZSM-5 and SAPO-11 both are medium pore zeolites and functionally similar, it would have been obvious to one skilled in the art at the time the invention was made to use the two molecular sieves either individually or collectively, expecting similar results on selectivity and activity for the end products.

Although Ladwig invention discloses the method to determine the pore size of the molecular sieves, it does not specifically mention individual pore size index of at least one channel of say, ZSM-5, (which the applicant selects as the first molecular sieve) and say, SAPO-11 (which the applicant selects as the second molecular sieve). Since the pore size index of these standard molecular sieves is an inherent property, it would have been obvious to determine the pore size indices of the two molecular sieves and

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claim that the pore size index of the second molecular sieve is less than that of the first molecular sieve.

Since Ladwig invention uses the same type of molecular sieves as claimed by the applicant, they must have one-dimensional non-interconnecting and three-dimensional interconnecting channels.

Claims 32, 36, 42-44, 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ladwig et al (US Patent 6,093,867) in view of Swan, III et al (US 2001/0042700 A1).

Ladwig invention does not disclose the third molecular sieve having a large pore size.

Swan invention discloses a process for converting naphthas and cycle oils produced in catalytic cracking reactions into light olefins (Page 1, paragraph 0002). The cracking process may be performed in one or more conventional FCC process units. Each unit comprises a riser reactor having a first reaction zone and a second reaction zone upstream of the first reaction zone (Page 2, paragraph 0014). More than one type of catalyst particle may be present in the catalyst. For example, individual catalyst particles may contain large-pore zeolite, shape-selective zeolite, and mixtures thereof (Page 3, paragraph 0023). One catalyst particle useful in the invention contains at least one crystalline aluminosilicate, also referred to as zeolite, having an average pore diameter greater than about 0.7 nanometers (nm), also referred to herein as a large

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pore zeolite cracking catalyst (Page 3, paragraph 0024). Suitable zeolite in such catalyst particles include zeolites which are iso-structural to zeolite-Y. These include the ion-exchanged forms such as the rare-earth hydrogen and ultra stable (USY) form (Page 3, paragraph 0026). Another cracking catalyst contains a mixture of zeolite-Y and zeolite beta. The Y and beta zeolites may be on the same catalyst particle, on different particles, or some combinations thereof (Page 3, paragraph 0027). Another cracking catalyst contains a mixture of zeolite Y and a shape-selective zeolite species such as ZSM-5 or a mixture of an amorphous acidic material and ZSM-5. The zeolite portion of the catalyst particle will typically contain from about 5 wt % to about 95 wt% zeolite-Y (or alternatively the amorphous acidic material) and the balance of the zeolite portion being ZSM-5 (Page 3, paragraph 0028). Shape-selective zeolite species include medium- pore-size zeolites generally having a pore size from about 0.5 nm to about 0.7 nm, and including MFI, MFS, MEL, MTW, EUO, MTT, HEU, FER, and TON structure type zeolites (Page 3, paragraph 0029). Other suitable medium-pore-size zeolites include SAPO-4 and SAPO-11 (Page 3, paragraph 0030).

It would have been obvious to one skilled in the art at the time the invention was made to add large pore size zeolites disclosed in Swan inventions in the medium pore size zeolite disclosed in Ladwig invention for a better product distribution.

Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ladwig et al (US Patent 6,093,867) in view of Purvis et al (US Patent 5,981,818).

Ladwig invention does not disclose separating and polymerizing propylene.

Purvis invention discloses a method of integrating cracking and olefin derivative processes utilizing dilute olefins as feedstocks. More particularly the present invention relates to an integrated process for preparing olefin derivatives from hydrocarbon feedstocks by cracking the hydrocarbon feedstocks, and separating the olefins from the cracked gas into dilute olefin feeds for olefin derivative processing. Most particularly, the present invention relates to an integrated process for manufacturing ethylene and propylene derivatives from catalytic and non-catalytic cracking processes (Column 1, lines 10-20). The dilute propylene stream obtained from the olefins purification process step may be employed as the dilute propylene feedstock for a polypropylene polymerization process in accordance with the present invention (Column 10, lines 15-18).

It would have been obvious to one skilled in the art at the time the invention was made to take the propylene feedstock from Ladwig invention and polymerize to make polypropylene as disclosed in Purvis invention for making use of the propylene produced in catalytic cracking process of Ladwig.

Response to Arguments

The Applicant argues that the reference (Ladwig, US Patent 6,093,867) fails to suggest the unexpected results obtained from using a mixture of catalyst as discovered by the present inventors.

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The Applicant's argument is not persuasive because Ladwig discloses, "The catalyst may be ZSM-5 or other small or medium pore zeolites." (Column 6, lines 61-62). Also Shawn (US 2001/0042700 A1) discloses, "The catalyst may comprise one or more individual catalyst particles. More than one type of catalyst particle may be present in the catalyst. For example, individual catalyst particles may contain large pore zeolite, shape selective zeolite, and mixtures thereof." (Page 3, paragraph 0023). "Yet another cracking catalyst contains a mixture of zeolite Y and a shape selective zeolite species such as ZSM-5." (Page 3, paragraph 0028). "Other suitable medium pore zeolites include the SAPO-4 and SAPO-11." (Page 3, paragraph 0030).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 6:30 AM-3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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